QQ plots, random set and data from a heavy tailed distribution

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The QQ plot is a commonly used technique for informally deciding whether a univariate random sample of size n comes from a specified distribution F. The QQ plot graphs the sample quantiles against the theoretical quantiles of F and then a visual check is made to see whether or not the points are close to a straight line. For a location and scale family of distributions, the intercept and slope of the straight line provide estimates for the shift and scale parameters of the distribution respectively. Here we consider the set $\S_n$ of points forming the QQ plot as a random closed set in $\mathbb{R}^2$. We show that under certain regularity conditions on the distribution F, $\S_n$ converges in probability to a closed, non-random set. In the heavy tailed case where $1-F$ is a regularly varying function, a similar result can be shown but a modification is necessary to provide a statistically sensible result since typically F is not completely known.

This is a joint work with Sidney Resnick.

List of invited speakers Schedule for December 13